Space Weather Forecast

Issued on Thursday, 17 August 2023 at 13:04 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Initial Slight Chance of G1 Minor Geomagnetic Storm, falling into UTC weekend. Chance of R1 Minor Radio Blackouts throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over the past 24 hours, with occasional mid-ranking Common-class flares observed, peaking with a long-period CME-generating event recorded at 17/0245UTC from the southwestern solar horizon.

There are currently up to nine sunspot regions on the facing side of the Sun at present. It is generally the case that the more complex or dynamic regions are near the middle of the Sun at present - making any CME-tied flares more noteworthy should they occur.

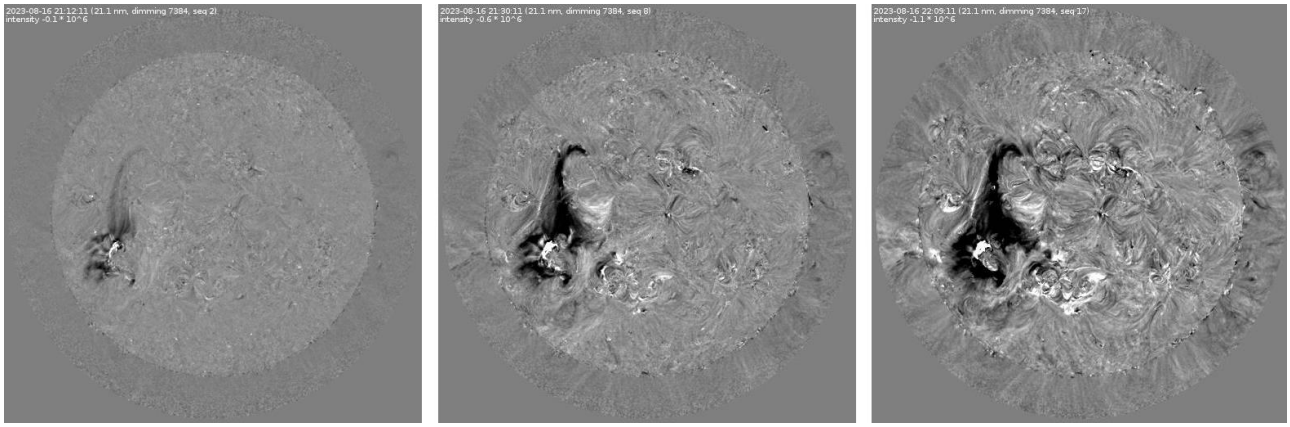

Figure 1: Possible signature of a Coronal Mass Ejection (CME) surrounding a minor X-ray flare from a small sunspot around 17/2123UTC. At the time of writing there is no clear link between this and any subsequent ejecta on imagery, however the situation is being monitored.

Some of the more notable events in imagery in the period include the CME following the peak flare mentioned above. This has been analysed, and although modelling result have yet to come back, any Earth-directed component is considered very unlikely. In many ways, the opposite problem occurred in a second minor Common-class flare from a small sunspot in the southeast at 17/2123UTC. Despite this possible 'smoking gun' signal, there is not any clear ejecta on satellite imagery tied to this event at the time of writing, but it remains the main uncertainty and source of monitoring. At present then, no Earth-directed CMEs were observed in the available imagery.

Solar Wind / Geomagnetic Activity: The solar wind was characterised by a discontinuity in many solar wind measures around 16/1300UTC. The solar wind speed and number of particles seen passing Earth were very muted, and the cause is not certain, but this could perhaps be a more decided entry in the overdue and evidently small magnitude fast solar wind.

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The solar wind speed was subdued over the 24 hours, remaining within background levels throughout, but with a hesitant very gradual upward trend. The number of particles passing Earth in the solar wind was highest in the possible density increase (Co-rotating Interacting Region (CIR)) that preceded this 24-hour period - peaking immediately before 16/1300UTC - before falling to more typical background values. The magnetic field associated with the solar wind also became slightly elevated around this time before moderating later in the period. The north-south component was strongly anti-aligned with Earth's field at first (generally to greater geomagnetic effect), later becoming smaller magnitude and more erratic into the current UTC day.

The net result of the above solar wind measures was provisionally a little disturbed at first, but gradually falling with time to quiet conditions.

Energetic Particles / Solar Radiation: No solar radiation storms were observed, however solar radiation showed a lagged slight response to the peak X-ray flare of the period, peaking at around UTC dawn at fractions of a pfu (i.e. well below 10pfu S1 Minor Solar Radiation Storm levels).

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is currently low. There remains a daily chance of Moderate activity, with the regions perhaps most likely to produce significant flares being near the solar meridian.

Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs currently in the forecast.

Earth is likely now in a very weak fast wind, and should shortly experience a second similarly muted feature inside the next 24 hours. There is a peak slight chance of G1 Minor Geomagnetic Storm at first that should fall to become largely quiet once again over the coming UTC weekend.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, with the most recent very slight enhancement likely to have peaked and perhaps unlikely to repeat at higher level in the near-term.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	1	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	30	30	30	30
Very Active	R3 to R5 X	No	2	2	2	2

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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